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TWO NEW SUBSPECIES OF KANGAROO RATS,
GENUS *DIPDOMYS*

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In the course of revising the banner-tailed kangaroo rats, *Dipodomys spectabilis*, and the desert kangaroo rats, *Dipodomys deserti*, considerably more material has been available for examination than previously was recorded. Specimens of *D. spectabilis* from Sonora, México, previously have not been critically studied and those from the west central part of the State have not been reported before. More specimens of *D. deserti* are now available from the northwestern part of the range of this species. This material provides the basis for the recognition and description of two new subspecies.

Specimens of the two subspecies described in this paper were examined in the collections of either the Museum of Vertebrate Zoology, University of California, Berkeley (MVZ), or the Museum of Natural History, University of Kansas, Lawrence (KU). I thank the following persons for the help rendered to me during this study: Seth B. Benson, William Z. Lidicker, Jr., and C. S. Thaler (MVZ) and E. Raymond Hall and J. Knox Jones, Jr. (KU). Capitalized color terms are from Ridgway (1912).

Specimens of *Dipodomys spectabilis* from Sonora, México, are scarce. In his original description of the Arizonan *Dipodomys spectabilis perblandus*, Goldman (1933:467) referred two specimens from Magdalena, Sonora, to this subspecies. Burt (1938:46) lists specimens from Cerro Blanco, from Noria, and from 2 mi. S Sásabe under the name *D. s. perblandus*. Material from Ebano, Sonora, was referred to *D. s. zygomat-*

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icus by Villa (1941:372) and has recently been included with *D. s. perblandus* by Alvarez (1960:406–407). Alvarez (*ibid.*) also records material from La Sauceda, 15 mi. NNE Cananea, and from 9 mi. N Cananea as *D. s. perblandus*. These specimens from near Cananea are here regarded as *D. s. spectabilis*. Specimens from west central Sonora are distinct enough to be recognized as a new subspecies which may be named and characterized as follows:

***Dipodomys spectabilis intermedius*, new subspecies**

Holotype: Female, adult, skin and skull; No. 82782, Museum of Vertebrate Zoology, University of California; from 16.7 mi. SW Bámori, 1900± feet, Sonora, México; collected by Seth B. Benson, 25 April 1938, original number 5301.

Paratypes: All from the type-locality: MVZ Nos. 82780–81 ♂♂, 82783–84 ♀♀, 82785–87 ♂♂, and 82788 ♀.

Geographic distribution: West central Sonora.

Known at present from the vicinity of Querobabi on the north, southward to Carbo, and westward to a locality about 17 mi. SW of Bámori. Limits of the range of this subspecies are not well known.

Diagnosis: A small subspecies of *Dipodomys spectabilis* averaging in total length 318.5 to 325.0 mm; tail length, 184.9 to 188.8 mm; ear length about 16.6 mm; distal white tip of the tail short, averaging 20.0 to 21.0 mm; light in weight, averaging 98.9 to 106.1 grams.

Color: Upper parts light ochraceous-buff mixed with pinkish buff; sides with more evident pinkish buff; arietiform markings dusky; plantar stripes light brown; dorsal and ventral tail stripes darkish; subterminal band at end of tail blackish; tuft of hairs at base of tail ventrally grayish.

Skull: Size small; greatest length averaging 43.0 to 43.2 mm; basal length averaging 31.0 mm; breadth across maxillary arches small; posterolateral edge of maxillary arches slightly flared; rostrum narrow; auditory bullae small; greatest breadth across bullae averaging 27.0 to 27.7 mm; supraoccipital and interparietal narrow; least width of supraoccipital averaging 1.7 to 2.0 mm; narrow across exoccipitals; external openings of auditory meatuses oval; incisor usually small; mandible small, mandibular length averaging 17.9 to 18.0 mm. Also see measurements.

Comparisons: Compared with *D. s. perblandus*, *Dipodomys spectabilis intermedius* is more pinkish in color; slightly smaller in total length, tail length, length of hind foot, greatest length of skull, basal length, bullar depth, mandibular length, size of mastoidal bullae, and greatest breadth across bullae; pterygoid foramina slightly larger and directed more anterolaterally; breadth across maxillary arches, nasal length, and least interorbital breadth usually smaller; breadth across exoccipitals usually slightly smaller; interparietal and supraoccipital usually smaller; jugals usually narrower; teeth slightly smaller.

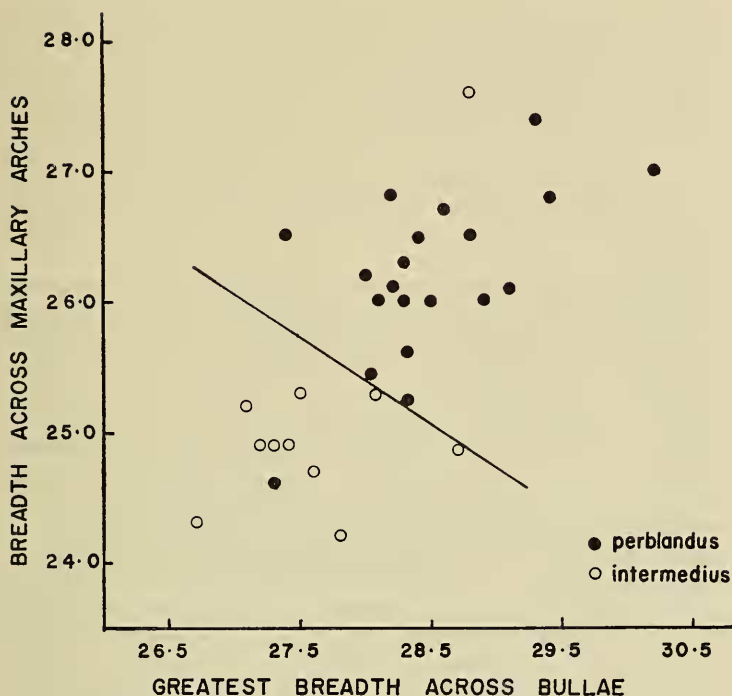


FIG. 1. Scatter diagram comparing *Dipodomys spectabilis intermedius* with *Dipodomys spectabilis perblandus* from Sonora, México, on the basis of breadth across the maxillary arches and greatest breadth across the bullae.

In a scatter diagram using breadth across the maxillary arches and greatest breadth across the bullae, it is possible to separate 91 percent of all adult *D. s. intermedius* from 95 percent of all adult Sonoran *D. s. perblandus* (Fig. 1).

Detailed comparison with the larger *D. s. spectabilis* is not needed here since *D. s. intermedius* is removed geographically from *D. s. spectabilis*, and because specimens belonging to this latter subspecies are even larger than those of *D. s. perblandus*.

Measurements: Mean and extremes of seven specimens from the type-locality, in mm, are: Total length, 325.0⁶ (314.0 to 330.0); tail length, 184.9 (174.0 to 195.0); length of white tip of tail, 20.0 (13.0 to 25.0); hind foot length, 47.6 (46.0 to 49.0); body length, 137.3 (130.0 to 146.0); greatest length of skull, 43.0⁵ (42.1 to 44.2); basal length, 31.0⁴ (30.5 to 31.8); length of nasals, 15.7 (15.2 to 16.8); greatest breadth across bullae, 27.7 (27.2 to 28.7); rostral width, 4.3 (4.1 to 4.4); bul- lar depth, 14.4 (14.2 to 15.2); alveolar length of maxillary tooth row,

5.9 (5.3 to 6.3); least width of supraoccipital, 1.7⁵ (1.4 to 2.2); breadth across exoccipitals, 13.1⁴ (12.7 to 13.4); mandibular length, 17.9 (17.3 to 18.5); weight (grams), 98.8 (94.9 to 105.7).

Remarks: *Dipodomys spectabilis intermedius* is a small, pinkish buff-sided subspecies, with a short white tip of the tail. It is closely related to *D. s. perblandus*. Inasmuch as the former subspecies is intermediate morphologically between *D. s. perblandus* and *D. s. nelsoni*, the name *intermedius* seems appropriate. *D. s. intermedius* does not represent the terminus of clinal variation within the range of measurements of *D. s. perblandus*.

Dipodomys spectabilis intermedius intergrades with *D. s. perblandus* in central Sonora. One adult from 5 mi. W Querobabi which is referred herein to *D. s. intermedius* has a wide interparietal, wide supraoccipital, and small round openings of the external auditory meatuses, similar to those of *D. s. perblandus*.

Variations within *D. s. intermedius* include the following: One of five adults from 45 mi. N Hermosillo has the breadth across the maxillary arches and the greatest breadth across the bullae slightly larger than the typical. In two of seven adults from 16.7 mi. SW Bámori, the least width of the supraoccipital approaches that of *D. s. perblandus*.

Specimens from 45 mi. N Hermosillo were found associated with grass and palo fierro or ironwood (*Olneya tesota*) and those from 16.7 mi. SW of Bámori were found associated with grass, creosote (*Larrea* sp.), and palo verde (*Cercidium* sp.). Similar habitat to that from which specimens of *D. s. intermedius* have been taken is available in areas nearby, and future collecting will probably show that this subspecies has a wider geographic range. The limited number of specimens available from Sonora probably reflects the difficulty of access for collecting in much of this region.

Specimens examined: A total of 18 specimens from the following localities:

SONORA. 16.7 mi. SW Bámori, 1900± ft, 9 (MVZ); 5 mi. W Querobabi, 4 (KU); 45 mi. N Hermosillo, 2100± ft, 5 (MVZ).

The new subspecies of *Dipodomys deserti* is from the northwestern part of the range of the species and may be named and characterized as follows:

***Dipodomys deserti aquilus*, new subspecies**

Dipodomys deserti deserti: Hall, 1946:428 (part).

Holotype: Male, adult, skin and skull; No. 126411, Museum of Vertebrate Zoölogy, University of California; from 1½ mi. NW High Rock Ranch, T28N-R17E, Sec. 26, about 12 mi. SE Wendel, 4080 ft, Lassen Co., California; collected by C. S. Thaler, 21 July 1960, original number 1022.

Geographic distribution: East central Lassen Co., California, and northwestern Nevada.

More specifically, from the vicinities of Wendel and High Rock

Ranch, Lassen Co., California, E in Nevada to the vicinities of Nixon and Flanigan, Washoe Co., NE to the vicinity of Jungo, Humboldt Co., and SW to Adobe Flat and the vicinity of Toulon, Pershing Co. Limits of the range are not too well known especially in the northern and northwestern parts, and future collecting may reveal a wider range of this subspecies in these directions.

Diagnosis: A small subspecies of *Dipodomys deserti* averaging in total length about 323.5 mm; tail length in males about 193.4 mm; body length about 132.2 mm.

Color: Upper parts pale ochraceous-buff, heavily mixed with grayish and long blackish hairs; arietiform markings dusky; orbital ring blackish; plantar stripe brownish-black; dorsal tail stripe dark; ventral tail stripe dark and usually present; subterminal band at end of tail blackish.

Skull: Size small; greatest length averaging in males about 44.2 mm; breadth across maxillary arches narrow, measuring about 22.6 mm; nasals short, about 16.2 mm; greatest breadth across auditory bullae narrow, averaging in males about 29.5 mm; incisors slightly heavy. Also see measurements.

Comparisons: Compared with *D. d. deserti*, *Dipodomys deserti aquilus* is usually smaller in size especially in total length, tail length, and body length. Color of the upper parts, arietiform markings, plantar stripe, and dorsal tail stripe darker; ventral tail stripe usually present. Skull smaller particularly in greatest length, maxillary breadth, nasal length, and greatest breadth across the auditory bullae; the incisors are usually wider.

Measurements: Measurements, in mm, of two adult males and one adult female, respectively, from 21 miles west and 2 miles north of Lovelock, Pershing Co., Nevada, are: Total length, 325.0, 326.0, 328.0; tail length, 195.0, 191.0, 190.0; length of white tip of tail, 15.0, 18.0, 10.0; length of hind foot, 53.0, 51.0, 51.0; body length, 130.0, 135.0, 138.0; greatest length of skull, 44.3, 44.0, 44.3; length of nasals, 16.7, 16.1, 16.6; breadth across maxillary arches, 22.3, 22.6, 23.0; greatest breadth across bullae, 29.6, 29.4, 29.6; rostral width, 4.0, 4.1, 3.7; bullar depth, 14.8, 14.8, 14.8; alveolar length of maxillary tooth row, 5.6, 5.5, 6.0; breadth across exoccipitals, 12.3, 11.6, 12.3; mandibular length, 18.8, 17.9, 18.0.

Remarks: Typical *Dipodomys deserti aquilus* is characterized by its small external measurements, dark color, and small skull, especially in greatest length, maxillary breadth, nasal length, and greatest breadth across auditory bullae.

Dipodomys deserti aquilus intergrades with *D. d. deserti* in northwestern Nevada. Specimens from 3¼ mi. NNE Toulon and 3 mi. E Toulon, Pershing Co., are slightly larger in total length, tail length, and greatest length of skull, have more buffy color than typical *D. d. aquilus*. The adult from the former locality and one adult from the latter locality do not have ventral tail stripes, suggestive of *D. d. deserti*.

The adult specimen from Lassen Co., California, and the young

specimens from Washoe Co., Nevada, are much darker than the other specimens from northwestern Nevada, having blackish colored upper parts, dark arietiform markings, and dark, well-defined ventral tail stripes. Hall (1946:430) correctly noted, in the specimens then available to him, the darker coloration of the northwestern populations in Nevada and the presence of the dark ventral stripe in some specimens. Nevertheless, Hall (*ibid.*) seemingly overlooked the slight but constant differences in the size of several external and cranial parts between these populations and those to the southeast.

The name *aquilus* (meaning blackish in Latin) was chosen because of the blackish color of the specimens belonging to this subspecies.

Specimens examined: A total of 12 specimens from the following localities:

CALIFORNIA. LASSEN CO.: 1½ mi. NW High Rock Ranch, T28N-R17E, Sec. 26, 4080 ft., 1 (MVZ).

NEVADA. Washoe Co.: 4½ mi. N, 4½ mi. W Flanigan, 4000 ± ft., 2 (MVZ). Humboldt Co.: 8 mi. E, 1 mi. N Jungo, 4200 ft., 1 (MVZ). Pershing Co.: 21 mi. W, 2 mi. N Lovelock, 4000 ft., 3 (MVZ); 3¼ mi. NNE Toulon, 3900 ft., 1 (MVZ); 3 mi. E Toulon, 3900 ft., 4 (MVZ).

Additional records: NEVADA. Washoe Co.: 6 mi. W Flanigan, 2 (Univ. Puget Sound, MNH); 16 mi. E Wendel [California] (Hubbard, 1961: 135); 4½ mi. N and 2½ mi. W Nixon, 2 (Coll. Ira W. La Rivers and T. J. Trelease according to Hall, 1946:431).

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